

Cabibbo-Kobayashi-Maskawa matrix: parametrizations and rephasing invariants

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Abstract content

This work is devoted to the general discussion of the Cabibbo-Kobayashi-Maskawa (CKM) matrix. First we propose a general method of the recursive construction of the CKM matrix for any number of families. This allows to set up a parametrization with desired properties. As an application we generalize the Wolfenstein parametrization to the case of 4 families and obtain restrictions on the CKM suppression of the fourth family. Motivated by the rephasing invariance of the CKM observables we next consider the general phase invariant monomials built out of the CKM matrix elements and their conjugates. We show, that there exist 30 fundamental phase invariant monomials and 18 of them are product of 4 CKM matrix elements and 12 are product of 6 CKM matrix elements. In the Main Theorem we show that all rephasing invariant monomials can be expressed as the product of at most 4 fundamental phase invariant monomials and the powers of the squares of the absolute values of the CKM matrix elements.

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